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India's DefExpo attracts positive attention

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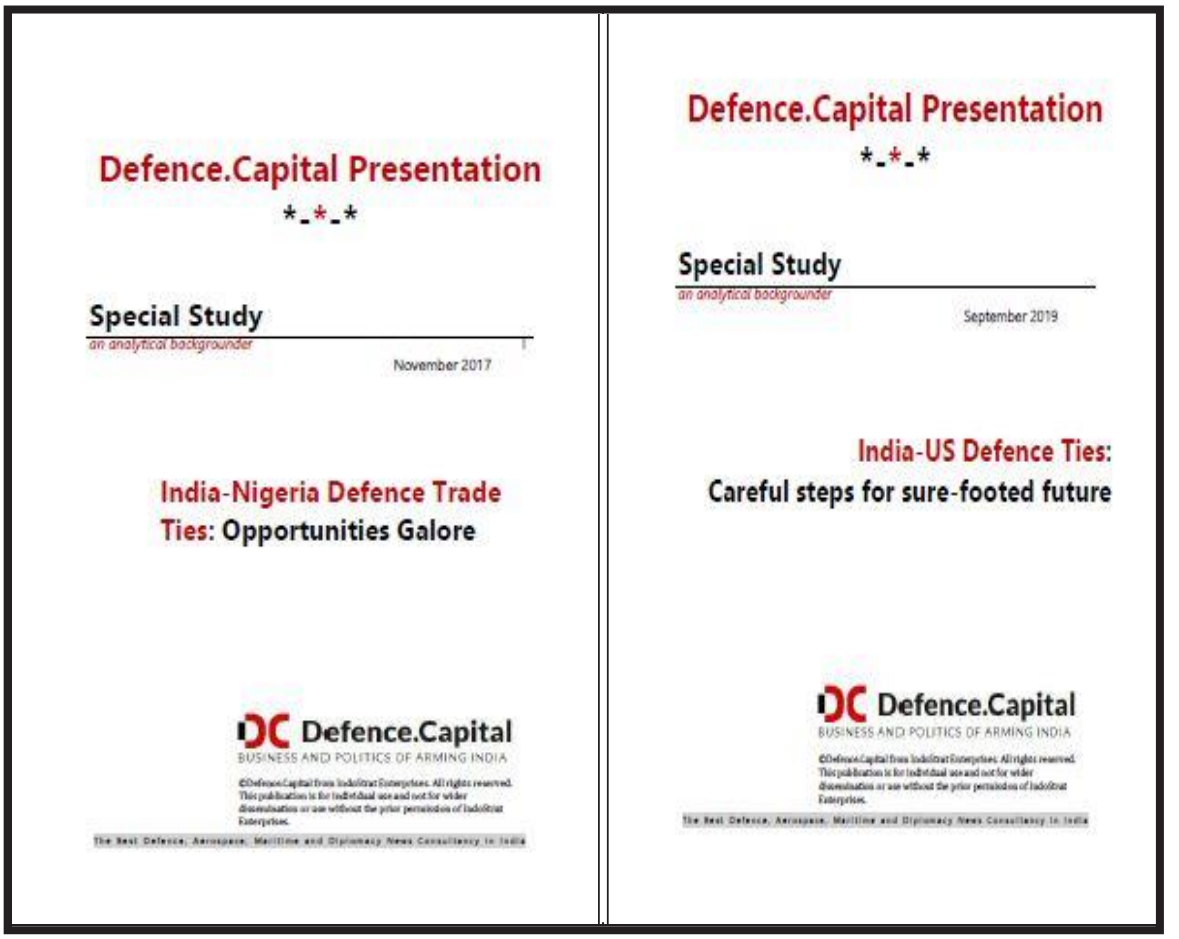

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EDITORIAL

Dear Readers,

Contrary to expectations, this year's DefExpo has been a well-organised event at Lucknow, with over 1,000 exhibitors participating in the five-day jamboree. Credit is due to Minister of Defence Rajnath Singh for conceiving the biennial defence show at Lucknow, his home parliamentary constituency in the state of Uttar Pradesh.

Though there were issues regarding Lucknow's capability to accommodate the large number of guests descending on the city for DefExpo, the Kumbha Mela experience of the state's Chief Minister Yogi Adityanath had come in handy, and the state government's special, keen interest in the defence event had helped tide over the challenge.

There was overall appreciation for the facilities – the most basic of them – at the DefExpo venue this edition, unlike the bad experiences of guests at the previous two editions at Goa and Chennai. The DefExpo this time was certainly larger in size and scope.

But don't get overwheled by the over 1,000 exhibitors at the show. Not all were aerospace and defence companies. The UP Pavilion, especially, had no defence firms showcasing their military ware. The UP Pavilion would have suited the Kumbha Mela, but not a military show, if sarees, kurtas and eatables are the wares to showcase for the state's Defence Industrial Corridor.

However, what needs true appreciation and kudos is the personal interest and participation on all business days of both Rajnath Singh and Yogi Adityanath. Their intent on developing and promoting Uttar Pradesh as an aerospace and defence industry destination was on full display.

Timely Payments

Just ahead of the event itself, Finance Minister Nirmala Sitharaman presented only her second budget under Modi 2.0 government. The paltry hike in the defence budget hasn't really enthused the aerospace and defence industry, who were expecting the government to allocate more than what it had in the recent years so that the sector gets energised, with orders that enable future investments and job creation.

The current defence budget will be of good use if only the government makes timely payments for the military equipment that it has already ordered from the industry. The six to eight months delay that the industry is facing in receiving payments for wares that it has already delivered will hit not only their cashflows, but also future timely deliveries of equipment to the Indian armed forces. Money needs to be in circulation before it can create value, both for the armed forces and the Indian economy.

Buyer Nominated Equipment

A related issue is the new Buyer Nominated Equipment or BNE that the Defence Procurement Procedure of 2016 has introduced. Under the DPP, the government dictates that the BNE must be procured from the Defence Public Sector Undertakings for a sub-system in a system of systems that is being bought for the armed forces from the Indian private sector. But the private sector is forced to bear the cost of making payments towards the BNE to the DPSU.

This a huge burden on the private sector firms, and the government needs to rethink this procurement process, particularly if it can take on the responsibility of paying the DPSUs for the BNE, instead of the private firm that will ultimately supply the system of systems to the armed forces.

A welcome change would be for the government to directly pay the DPSU for the BNE and in turn, reduce the cost to the private company that will supply the system of systems.

N C Bipindra
Editor

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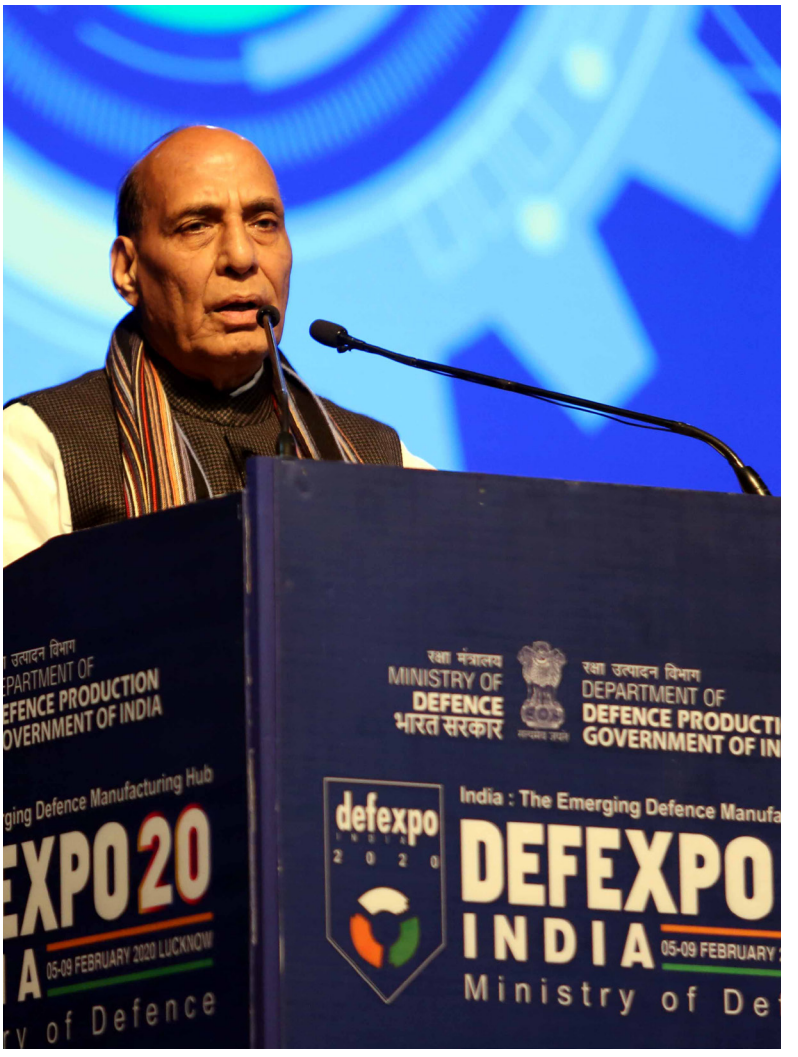

Visual impact of DefExpo 2020

The Lucknow edition of the biennial signature defence exhibition of India turns out to be a major success. **P 18**

Data Sovereignty: The pursuit of supremacy

By Vinit Goenka

"Data is the new oil, Data is energy, Data is power and whosoever controls data, controls the minds and controls the world."

For centuries the world has faced colonization, be it military, energy, and now a new phenomenon called 'data colonisation'. Hence, 'Data Sovereignty' is the only tool to fight Data Colonization.

Storage of Data has been a major challenge and cloud has given rise to concept of cross-border storage of data. But, is this concept been used to colonise Indians? What stops India from storing its own data and computing its own data? Why can't critical data remain within the geographical and legal boundaries of India?

A report suggests that India has crossed 800 million mobile phone users in 2019. It is expected that one million gigabytes of data a day will be carried by internet networks in India by 2021-22. The data ranges from entertainment, social media, health records, financial services, education, e-governance, research, science and technology, to defence.

Over the last decade, we have seen Russia, Germany, France, Indonesia, Vietnam mandate through their strict data sovereignty laws that their citizen's data be stored on physical servers within the country's physical borders.

Europe has implemented General Data Protection Regulation (GDPR), which also restricts organisations from transferring personal data that originated in Europe to any country with inadequate data protection laws.

Australia has clearly defined legal framework with its updated Australia Privacy Act on how the data should be stored and controlled. United States federal agencies and defence organisations require their data be stored exclusively within the United States for national security.

But when it comes to India, most of these countries adopt

double standards. They want free flow of data citing reasons like accessibility, cost and security.

Data Sovereignty is a concept that the data are subject to laws within the nation it is collected. It is extremely important for India to urgently take this subject as a high priority to safeguard the interest of the nation.

National security and privacy should be prioritised over free trade thereby making clear that India's fundamental right to national interest and personal privacy cannot be negotiated during trade discussions.

As a part of Centre for Knowledge Sovereignty, an organisation championing the cause of data sovereignty in India, a series of discussions were conducted in the past three years along with Centre for Joint Warfare Studies (CENJOWS) to discuss with stakeholders from the focus area on subjects like data protection policy of India, cybersecurity and big data analytics, fourth generation technologies, empowering agencies and comprehensive data gathering and technology platforms, intel gathering and social media-based sentiment correlation, detecting critical cyber threats using native technology, cyber resilience for critical infrastructure and so on.

Major highlight of these discussions was around the national security aspect related to defence and critical infrastructure areas and it was concluded that national critical infrastructure is a perennial target. Be it government websites, defence organisations, our nuclear plants or strategic assets, there is a constant threat of cyberattacks.

This is a threat we must anticipate and face if we advocate data sovereignty. As a nation how soon we can gear up to be the best in cyber-defence? Between 2017 and 2018, globally $600 billion were spent to protect organisations from cyberattacks.

In India, $5.2 trillion of impact can be caused by attacks on data through cyberattacks alone. With mistakes, it could go up to $10 trillion in India.

The Indian armed forces have always been preparing anticipatory threat analysis (predictable threat analysis). The new threat is developing around the world and that war is battling an invisible enemy.

Things are happening faster than the human brain can

comprehend and taking effective counter - measures is the need of the hour. This can only be done by detecting advanced persistent threats and reducing the cycle time of detection from three months in average to just a few days if possible, with use of technology and Artificial Intelligence.

The conventional warfare is now changing to cyberwarfare with physical operations taking a back seat. Cyberwarfare begins before the physical warfare, be it hacking websites and data centers, attacking space operations, spreading fake news, blocking the systems, or any such advanced use of technology.

This highlights the point that we need to strengthen our cyber defence mechanisms, improve our threat research capabilities, improve cyber hygiene, and standardise security requirements. If data is on our physical domain, within Indian geographical boundaries, it is safe, else chances are high that it could be compromised. Hence all strategic and defence related data must be stored in Indian geographical and legal limits.

Cyber attackers are an organised sector today and no longer an isolated crime done by some sections of society with mere intention of ransom. It is a tool of war and an unpredictable one. India needs an efficient national cybersecurity strategy looking at the evolving cybersecurity environment.

Today, our cyber strategy is defensive more than preventive and offensive. This mindset needs to change if India wants to develop as a super-power. We need to empower National Disaster Management Authority so that it could fight cybercrime and attend to a post-cyber-attack scenario on critical facilities.

In clear terms, India needs to state that any breach of its cyberspace by foreign actors would be treated at par with violations of our sovereign territorial integrity, airspace or territorial waters. Our cyber strategy would be based on 'Forward Active Defense', and we should empower our agencies to neutralise the source and could use any means at our disposal to inflict unacceptable damage on the attacker.

Currently, 27 ministries in the government of India are dealing in cyber sector with varying priorities and funding. There is an urgent need to establish a tri-service Defence Cyber Command, as envisaged by the Shekatkar Committee. This new military command should function directly under the Chief of Defence Staff, who will be a single point of contact to Cabinet Committee on Security (CCS). It would also help in real-time information sharing and coordination with other government cyber agencies like CERT-IN.

Our intelligence gathering apparatus currently focuses on identifying and monitoring short-term and long-term threats to the country's diverse interests spanning economic, geostrategic and defence frontiers. As the threats diversify and the actors intensify their efforts to attack us and our interests, we need to ramp up our ability to defend ourselves and protect our national interests and assets. Data collection platform need to be auto-mode sensor-based Internet of Things and Artificial Intelligence-based built-in data analytics algorithms.

We, Indians, are one-sixth of the world, one-fifth of internet users and one-fourth of digital consumers. Along with data localisation, there is also a need to compute it within the country. India certainly has the talent to do this, but capacity development and creation of an abundant workforce of cyber professionals skilled in data and cyber security for all mission critical sectors with frequent skill upgradation training should find a priority.

By 2020, India will be a $7-billion data centre market as per Cyber Media Research, at a growth rate of 23 per cent. Along with the US and the EU, China and Russia have been the strongest advocates of data sovereignty and the protection of data of its citizens from going outside the country.

The Indian government, led by Prime Minister Narendra Modi, has clearly expressed the need of Data Sovereignty. But a lot more needs to be done to ensure that data sovereignty is supported with strong policy framework, infrastructure support and conducive business environment.

Data sovereignty is a boon for law enforcement agencies, who require access to personal data to conduct investigations and maintain national security. Sentiment and perception management is the biggest target for cyber-attacks, where in fake news and incorrect data is circulated easily due to lack of legal framework for carriers of data on their platforms.

Defence organisations in India have been constantly a target of such fake news, especially in sensitive areas. Today, this access of social media channels is constrained by the fact that many e-commerce and social media companies are based in other countries and are required to comply with foreign privacy laws, barring them from sharing data.

Data sovereignty will, to a large extent, help in easy access of data, and advanced analytics tools can help in curbing misinformation from spreading in society. Internal security, along with borders, must be guarded by the law enforcement agencies, defence personnel and security experts.

Several large organisations, headquartered in the US and the EU, ironically, have lobbied against data localisation rules around the world including India, stressing that it would make their operations more complicated and costly.

Let us see the arguments one by one. First, they say that data localisation in India is a security threat. This perception is wrong because data is as secure in India as in the US, the EU or Ireland or Singapore.

Second, their arguments are flawed because they are just looking at India as a generator of data, as they only have commercial interest in our data and want to look at India as a hub for collecting data of 130 crore-plus people of diverse background. Indian data is adding to their research activities without the common Indian citizen even knowing about how their personal and private data is getting used.

Third, the cost factor. This is the biggest flaw in the argument, because India is one of the most economical of destinations for acquiring land for data centres, as the data centre can be located in remote areas or small cities as well. Today, the government of India has shown its readiness to make the atmosphere conducive for business to thrive in India across all states ensuring ease of doing business, single window clearance system, better roads, air connectivity, adequate power supply, political stability, secure atmosphere, good tax rate cuts, labour arbitrage, and relaxation of Goods and Services Tax.

The government of India needs to address the below matters on a war footing to ensure investor confidence and boost the data sovereignty of India:

Taxation policy - Data centers are highly capital-intensive, involving huge investment in land, property, high end infrastructure, Information Technology equipment, cooling system, disaster recovery mechanism, power infrastructure, and

backup fuel. India must adopt an incentive plan in direct corporate taxes and GST, and import duties, if any, to encourage fresh investment in India. Property and land taxes can be reduced for data centres. Tax holidays must be given for period of 15-20 years to attract investment like IT sector (SEZs)

Data Protection and Privacy laws - A strong data protection policy is the need of the hour and it must be taken up in Parliament immediately.

Data Encryption policy - An enterprise grade encryption services must be approved and faster approval by Department of Telecom must be ensured.

Data Analytics - Just the way US announced its Big Data Research and development initiative, we must start investing in dig data analytics to derive meaning from the data available in India. It can give a major boost to Indian IT companies and startup.

India is the largest importer of defence equipment, and the indigenous component remains quite a small portion of our military inventory. We cannot fulfil our aspiration of self-reliance in defence and move towards data sovereignty, unless we enhance capability of indigenous technology and hardware, be it from the private Indian sector companies or Public Sector Undertakings. Technology, when created, is morally neutral. It's the environment that converts it into good or bad. Now, data monetisation seems to be an overarching concern hence we should focus more on indigenous technologies, be it hardware or software.

Finally, the government must immediately decide if data sovereignty is in the Concurrent List or the Central List or the State List in the Constitution of India.

(The author is the Secretary of Centre for Knowledge Sovereignty and Member, Governing Council, Centre for Railway Information System (CRIS), Ministry of Railways, Government of India)

Defence budget to cater for committed liabilities, a little more can do

By Shanti Kuber

The Parliament Standing Committee on Defence had asked the defence ministry to "strongly press" for additional funds from the finance ministry to enable the military to buy new equipment and also pay for weapons and systems it has already contracted to purchase, at a time when the armed forces projected a combined requirement of almost Rs 100,000 crore ($14 billion) more under the capital head for 2019-20.

Contrast this with the allocations made by Finance Minister Nirmala Sitharaman, with a modest increase in the Defence Budget pegged at Rs 332,053 crore ($46.5 billion) for the 2020-21 fiscal, an increase of Rs 6,767 crore ($946 million) from the Revised Estimate (RE) stage of 2019-20.

At 1.43 per cent of the Gross Domestic Product (GDP), it still reads into the requirements of the Indian armed forces. Not all countries can meet all of the aspirations of the forces. Within the given constraints, the budget 2020-21 comes out strong on many counts.

Let's see the capital budget, generally considered for modernisation of the forces. The overall allocation made is of Rs 113,734 crore ($16 billion), a marginal increase of 3.03 per cent from the RE stage.

Of this, the Indian Army has an increase of 9.19 per cent, with an allocation of Rs 32,392.38 crore ($4.5 billion). Of this, land and construction consume Rs 6,352.67 crore ($888 million). These monies are for new accommodation planned as part of the approved Key Location Plans in various Army Cantonments.

Investment in rolling stock is pegged at Rs 100 crore ($14 million), suggesting that the army will increase its strategic land logistics capability by a few wagons.

The Rashtriya Rifles, a counter insurgency force in the troubled border state of Jammu and Kashmir, get a very small allocation of Rs 100 crore ($14 million), indicating that the force needs to contend with just routine equipment in small numbers, although operating in challenging environment.

The National Cadet Corps, the youth force, and the Ex-servicemen Contributory Health Scheme have a capital allocation of Rs 27 crore and Rs 14 crore each, thus allaying any fears of closure of the health scheme for veterans, as has been floated in social media ahead of the budget.

So, that leaves us with Rs 25,798.61 crore ($3.6 billion) for modernisation for the army. It would be a fair assumption that the committed liabilities for equipment purchased in previous years is at a modest 80 per cent (it could be as high as 85 per cent too). That leaves the army with approximately Rs 4,500 crore ($630 million) for actually spending on procurement of new equipment and systems, and sign contracts from this money.

While this may look less, the good news is that Rs 4,500 crore accounts for 15 per cent of advance to be paid at the time of signing of contracts. Therefore, the Army can possibly sign contracts worth Rs 30,000 crore ($4.2 billion) in the 2020-21 fiscal, assuming that RE stage will not have any flowers to show up then.

So, what do the army target to buy in this small amount? I presume, they will have to pay the US for the six Apaches gunships that are under American Foreign Military Sales (FMS) route, for the Dhanush artillery guns through the indigenous route, Self-Propelled Air Defence Guns Missile System, 10 of the MQ9 armed drones that is being sought under FMS from the US, Indo-Russian AK-203 Assault Rifles, India-Russia Ka-226T helicopters, new assault rifles and Light Machine Guns.

Other key requirements such as the body armour would likely be catered under the powers of Vice Chief or the revenue route. The army's major committed liabilities would include T-90 tanks contracted from Heavy Vehicles Factory at Avadi, Assault Rifles from American firm Sig Sauer, VSHORADs from Russia, Anti-Tank Guided Missile from Bharat Dynamics Limited , upgrade of L-70 air defence guns from Bharat Electronics Limited, Air Defence Fire Control Radar from Israel Aerospace Industries, and few others. The army sure will have to prioritise its requirement.

In a similar analogy, the Indian Navy gets a total of Rs 26688.28 crore ($3.7 billion) for capital purchases and modernisation, including Rs 4,182 crore ($585 million) for the Naval Dockyard projects itself. That means, the navy would actually be left with Rs 22,506.28 crore ($3.1 billion). With 80 per cent committed liabilities, this amount actually reduces to Rs 4,501.66 crore ($629 million) for new purchases.

Allocation for the Naval Fleet has been reduced by Rs 2,688 crore ($375 million), which is 17.4 per cent lower than the RE stage, while there was much talk on upgradation of the fleet and dominance of the Indian Ocean Region, where China has at least eight warships, including nuclear submarines occasionally, at any given point of time.

Naval Aeroengines has definitely seen a raise that brings back hope on the MQ9 armed drones on FMS route, AEW&C aircraft from Boeing, a small amount for the Indigenous Aircraft Carrier, couple of surface warships, with few system level procurements can be expected in the next fiscal.

The navy will have to pay as part of their committed liabilities for the BrahMos missiles, P1135.6 frigates, anti-submarine warships, Varunastra torpedo, survey vessels, Diving Support Vessels, Barak missiles, amongst others with the current capital allocation.

MILITARY AID TO NEIGHBOURS

Bhutan: Rs 2,884 crore ($403 million)
Mauritius: Rs 1,025 crore ($143 million) - Reduced by Rs 75 crore ($10 million)
Nepal: Rs 800 crore ($112 million) - Reduced by Rs 400 crore ($56 million)
Afghanistan: Rs 400 crore ($56 million)
Maldives: Rs 300 crore ($42 million) - Reduced by Rs 26 crore ($3.6 million)
Myanmar: Rs 300 crore ($42 million) - Increased by Rs 270 crore ($37.7 million)
Bangladesh: Rs 200 crore (28 million) - Increased by Rs 50 crore ($7 million)
Sri Lanka: Rs 200 crore ($28 million) – Reduced by Rs 5 crore ($0.7 million)
Seychelles: Rs 140 crore ($19 million)
Iran: Rs 100 crore ($14 million) – For Chabahar Port

The Indian Air Force has received less than expected, with Rs 43,281.91 crore ($6 billion) for modernization, which is Rs 1587.23 crore ($222 million), which is 3.5 per cent less than the RE stage. Aircraft and aeroengines has received a boost from RE stage, with a hike of 23.8 per cent, clearly catering for additional MQ9, for which the Letter of Acceptance has been issued to the US government and a contract is likely in the next financial year.

It appears that the C-295 aircraft joint programme between Airbus and Tatas will be seen through next year and this could cost upwards of Rs 25,000 crore ($3.5 billion), of which a 15 per cent pay out as down payment will be effected next year, and so would the AEW&C based on the Airbus A330 aircraft.

While the air force would have to pay up for the committed liabilities for the Advanced Light Helicopters, search and rescue equipment, 'Tejas' Light Combat Aircraft Mk1A jets and for its systems, and Strum Ataka anti-tank missiles are all likely to go ahead in the next fiscal.

The IAF is privileged to be the only service with an allocation of Rs 1,001 crore ($140 million) for special projects and therefore, we expect to see few 'Make-II' category projects being pushed and approved.

The Defence Research and Development Organisation (DRDO) has been receiving a meagre part of the total defence allocation year after year. The 2020-21 fiscal will see the India defence scientific research agency getting Rs 10,532.87 crore ($1.47 billion). This appears to be highly inadequate for the 'Make in India' thrust of Prime Minister Narendra Modi.

For effective 'Make in India', an investment in research and academia is paramount. Will DRDO spend a major portion of this for development of the indigenous aeroengine?

On an analysis of categories, leaving aside the forces, there is an interesting revelation. Allocation to land and construction have maintained a linear curve increase, suggesting projects with the forces for a marginal enhancement of married accommodation. Aircraft and aeroengines have received the singular attention through a boost of 36.1 per cent from RE stage, significantly indicative of few programmes likely to fructify, as described above.

Heavy vehicles mobility has got a marginal increase, so none of the major programmes of FICV or FRCV are envisaged in the next fiscal, except for a few more trucks for the forces, benefiting Ashok Leyland, Tata Motors, Bharat Benz, Maruti (for the gypsies) and few other Indian motor vehicle manufacturers with small orders.

There is a decline of 16.5 per cent for other equipment indicating that sub-system level procurement will more or less follow the trend of the previous years, no definitive push is seen. For the Naval Fleet, there is, in fact, a reduction of 17.4 per cent, thereby providing little hope of major strategic partnership programmes such as Project 75I for the next generation conventional submarines reaching the contract stage. In any case, these programmes on Strategic Partnership model will take three years to reach conclusion. We hope they fructify in 2022.

On the revenue side, the army has the largest allocation of Rs 1,46, 940.51 ($20.5 billion), a meagre 0.02 per cent increase from the RE stage. Veterans need to be cautious since there is a decrease in the allocation of ECHS down from Rs 4,872.29 ($681 million) at RE stage to Rs 3,301.98 ($461 million), a reduction of 32.23 per cent. Few military farms will be sustained with an increased allocation of Rs 263.52 crore ($37 million). Pay and allowances of civilians has increased by 5.53 per cent, competing equally with the increase for the forces, at 5.57 per cent.

DGQA has also seen a decrease of 2.49 per cent, while one would have expected an increase here to realise the 'Make in India' initiative fully. Transportation has registered a decrease of 6.39 per cent, indicative of restrictions in major exercises and a general restriction on movement of vehicles. Allocation for stores at Rs 18,327 crore ($2.5 billion) is the revenue procurement under the Defence Procurement Manual (DPM). This has registered a decrease of 5.36 per cent; once again tying the hands of Army Commanders' financial powers, Vice Chief's financial powers and that of the Master General Ordnance. A dip in revenue procurement may not be good news for the industry that is supporting the forces. The story is similar with Navy and IAF, exhibiting consistency.

If one were to have a holistic picture of military diplomacy and view the budget from that angle, the Ministry of External Affairs has been allocated roughly the same amount as last year. However, from a military diplomacy point of view, allocation for aid to neighbouring countries has seen South Asia as a priority; neighbours first seems to be the policy. Allocations to the neighbours' military capability enhancement are as given in the table - a clear indication of the military diplomacy the government is focusing on. Exports of defence equipment to these countries would be encouraged.

Overall, there is a balance between military and diplomacy, with a marginal increase to the military and a clear focus on neighbouring nations.

(The author is Managing Director at Sugosha Advisory Private Limited, based in Gurugram)

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Hon'ble Union Home Minister of India

"There is a need for modernising the police force. Immediate steps should be taken towards the initiative for setting up smart police stations in the state."

-Shri Manohar Lal
Hon'ble Chief Minister of Haryana

Exhibition Focus Areas

- Body Armour
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Chinese PLA's ammunition logistics and management

By Michael Lima

In combat, soldiers can survive some amount of time without food, water, or medicine, but they cannot live one minute without ammunition. The world's first and second economies have two very different doctrines when it comes to governing and conflict may be inevitable. This article reviews open-source information on China's 'Belt and Road Initiative,' civil-military integration of ammunition production, and Joint Logistics Support Force ammunition storage. The integrated logistical system of ammunition supports China's forces through their supply system to the various fronts and parallels or may even surpass that of the United States.

Introduction

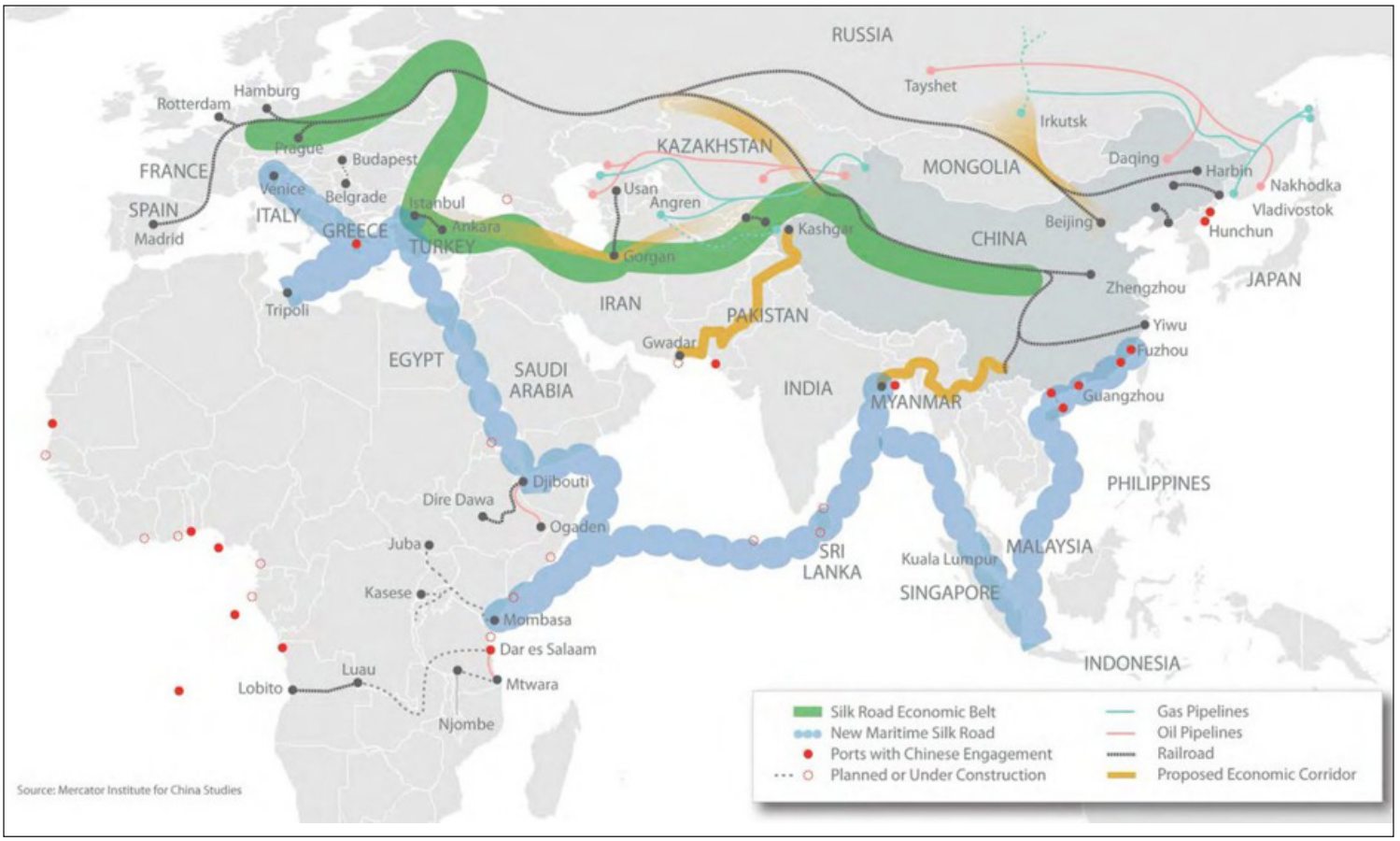
The ability to fight wars at the national level depends on the resourcing, manufacturing, and transportation of ammunition through the strategic supply system, from arsenal to the warfighter. As the United States military shifts its focus from counter-insurgency and the global war on terrorism to large-scale combat operations. Peer threats such as the People's Republic of China (PRC), known as China, bring the nation to the forefront as an adversary in combat operations. China's ruling party is the Chinese Communist Party and is the world's biggest exporter with the second-largest economy. The ability to project and sustain military forces in Eurasia will be a critical component of any conflict between the United States and China. China is now rivaling the United States economically.

China Infrastructure

China has shipped $2.494 trillion worth of goods around the globe in 2018, which reflects a 6.5 per cent gain since 2014 and a 10.2 per cent increase from 2017 to 2018. China has many of the world's busiest air and sea-ports that move freight and passengers to make China the lead exporter. With a railway of 121,000 km, a high-speed rail of 23,600 km, the road network of 4,500,000 km, expressway of 131,000 km, 235 civil airports, and 76 international airports, and with seven of the world's top 10 ports by cargo volume. China has the internal infrastructure to move goods out of the country from their vast 3,700,000 square miles of land. While China is a leader in the global economy, there is no shortfall of ambition in the communist party to progress beyond number two in the world economy.

China 'Belt and Road Initiative'

China has made great efforts to surpass the United States and become the economic world leader, leveraging its economic resources to implement the communist party's vision of the future. In 2013, Chinese President Xi Jinping announced plans to build the Silk Road Economic Belt and a 21st-Century Maritime Silk Road, which aims at enhancing infrastructure connectivity and boosting trade and investment of Eurasian from China's west through Central Asia to Europe. In figure 1, China's BRI increases the country's reach with many national partners in the form of direct foreign investment (DFI) of roads, bridges, rail, and ports. The BRI can move finished and



Map of the Belt and Road Initiative.

unfished goods from China to anywhere in Europe. China has also targeted investment to the continent of Africa and South America, expanding China's influence and customer base. The international community has also raised concerns over the lending practices of China of infrastructure to developing countries for the BRI. China tends to negotiate for ownership with decades-long leases from host nations when those countries cannot pay for the improvement project.

While China's BRI is an economic initiative, it can project military power easily were needed for Chinese military operations in the disputed territory. China's military stance has increased tensions throughout the Indo-Pacific area of operations - including the Senkaku Islands of the East China Sea with Japan, the Parcel/Spratly Islands of the South China Sea with Malaysia, Vietnam, and the Philippines, border standoffs in the Arunachal Pradesh with India, and the security relations in the Taiwan Strait between Taiwan and China. All of these conflicts have put China in direct opposition to NATO, US allies in the region, and the United States.

Civil-Military Integration

The United States has been able to have economic growth since World War II and become the World Power. The Department of Defense (DOD), with the largest budget remains the prime benefactor having an ever-increasing military budget that allows for the development of the military-industrial complex (MIC). The co-dependency of the military and military contractors such as Raytheon and Lockheed Martin; allows the US to create weapon systems and platforms, along with ammunition, bombs, and missile systems. The MIC created on a democratic system with companies that create products to make their shareholders profit. On the contrary, that is why DoD has its organic industrial complex to manufacture munitions that would not be profitable for an enterprise. During times of combat operations, the military-industrial complex would increase production and DoD would have its capability to produce in times of build-up to war but before the full conflict would be needed.

China, led by Xi Jinping, has been able to create its civil-military integration but unlike the United States, the communist party has a very different view of the expectations of civilian enterprises. The Commission for Integrated Military and Civilian Development's aim is to cut costs and integrate existing civilian technologies and services into the People's Liberation Army (PLA). The PLA is the key driver of requirements and state-owned enterprises (SOE) are the sole manufacturer of munitions and weapon systems in China. The state-controlled munitions production is led by one of its SOEs, without much open-source information on the inner workings of the factories.

China North Industries Corporation

The NORINCO Group is a state-owned enterprise incorporated in China and under the control of the State Council, which is actively engaged in the manufacturing of military and civilian products and has developed a global trade and information network. NORINCO group is the ordnance arm with over 300 sub-elements including factories (157 medium to large factories), research institutes, and trading companies. The producers of ammunition can be divided into Arsenals, providing ammunition to military forces, and Manufactures,

providing ammunition for exporting to the civilian market. State factories can be identified only by the headstamps, the markings on cartridge casing, such as 11, 121, and 947. Manufactures can be identified with head markings of letters such as CJ, CN, and NRC. Regardless of what product is made, all aspects of munitions production are controlled by the State Council through SOE. The communist party runs the logistical aspects of munitions production. During times of escalation China can easily create and send a stockpile of munitions to the front line troops or their allies.

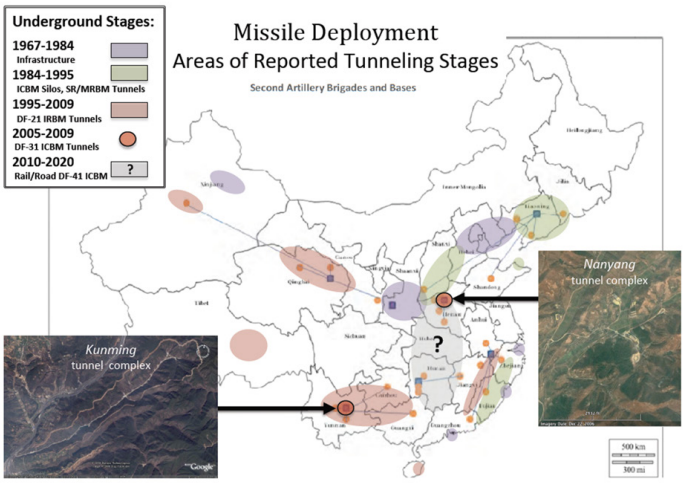
In some cases, China would hide the identity of their support by changing the headstamp, for example, using LC52, which LC stands for Lake City a United States production arsenal. As mentioned, ammunition production in China is wholly state-owned and would be the approving authority for any clandestine support to other nations. This type of authority and initiative from the State Council also reflects in the position that they want to see when it comes to ammunition production levels. China has been diligently working on upgrading ammunition facilitates and to increase productivity. China has embarked on an ambitious modernization effort, along with a quarter of the country's munition factories replacing workers with automation. The designed modernisation is to protect the interest and influence of China around the globe that will need a streamlined ammunition supply chain. China's ability to control all sectors of ammunition production, civilian and military, will be pivotal to possible conflict with the United States.

People's Liberation Army - Joint Logistic Support Force

The Central Military Commission (CMC) of the Communist Party of China commands its military. The military includes the Ground Force, Navy, Air Force, Rocket Force, Strategic Support Force, and Joint Logistic Support Force. Reforms announced in November 2013 established five Theater Joint Commands responsible for warfighting functions, replacing seven ground force military regions. The reforms allowed the CMC greater control of the military by flatting out the organizational structure and taking more control from military leaders into civilian leadership of the communist party. The Joint Logistic Support Force, created in 2016, consists of Wuhan Joint Logistics Support Base and five logistics support centers that support the theater commands, as seen in Figure 2. The Wuhan base and five centres are supported by multiple units and contain ammunition depots, warehouses, fuel depots, hospitals and underground facilities over a large region. The ability for CMC to streamline logistics directly to support centres offers China the ability to implement policy throughout the entire supply system quickly. The most comparable command to the US military would be United States Transportation Command, which is a unified command, with the ability to implement transportation changes throughout the entire system.

Storage at the national level for China is very elusive as open-source information does not show inner workings of either production facilities or that of storage facilities. Reports from the 1960s show that facilities such as; Chin-Hsien Ammunition Depot, Lo-Yuan Ammunition Depot, Nan-Ning Ammunition Depot, Kun-Ming Ammunition, and Supply Depot, Heng-Yang Ammunition, and Peiping Arsenal Complex had an extensive storage and production capabilities. These cities have been renamed, and imagery from Google Earth shows heavily populated cities and urban areas in place of where these locations were. The urban areas do not mean a reduction in ammunition production and storage; on the contrary, these types of activities are more of a state secret. For example, the naming convention of production facilities as 'state factory.' With only a number to distinguish between each factory. China has developed the technology to conceal and protect their operations.

Chinese Military Logistics and Support Units.



Map from: Mark A. Stokes and Ian Easton, *Evolving Aerospace Trends in the Asia-Pacific Region*, (monograph; Washington, DC: The Project 2049 Institute, 27 May 2010), pp. 8, 39. Tunnel stages estimated on the basis of PRC reference and reporting.

Missile Tunnel Complex areas.

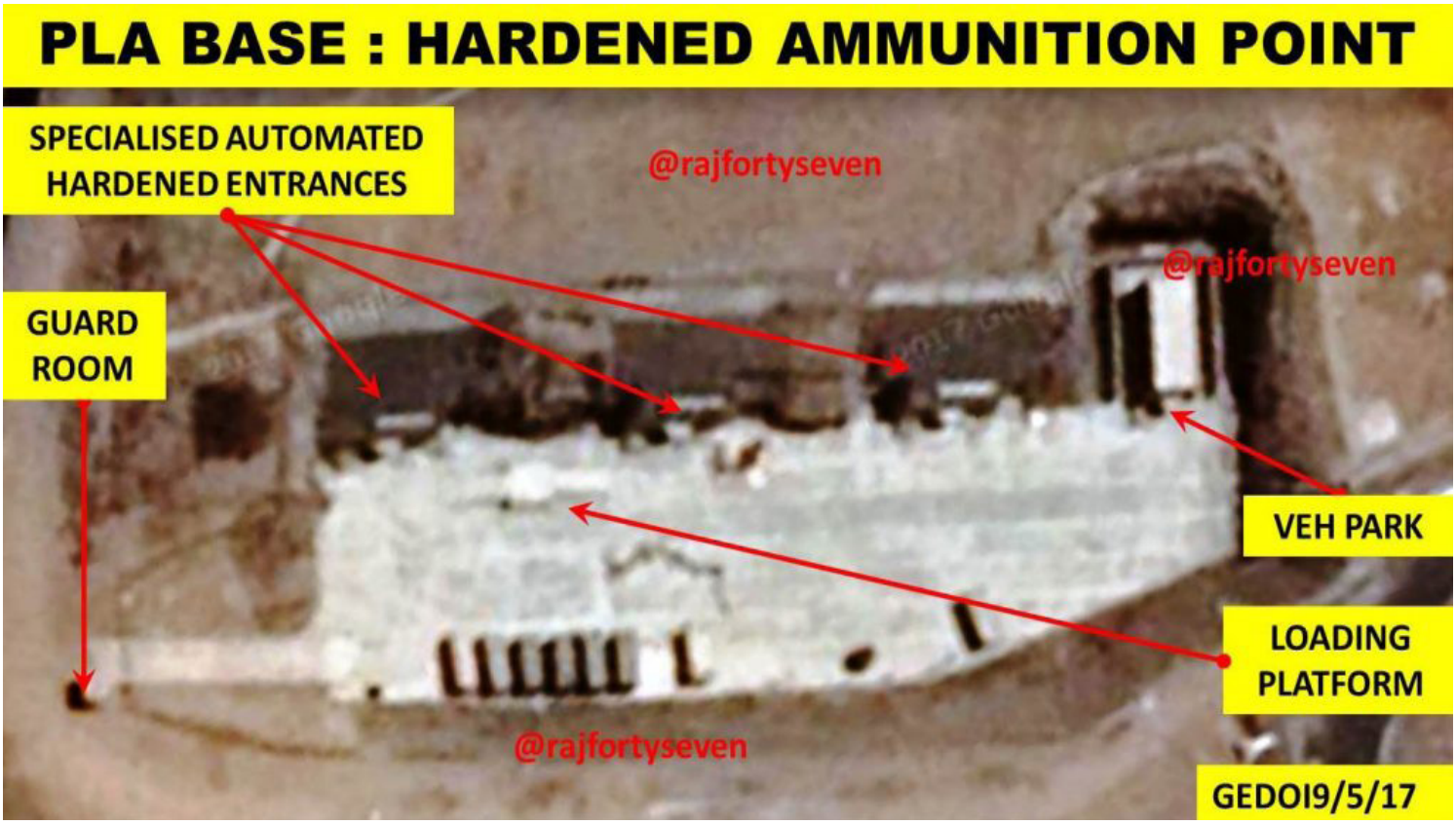
The most extensive is the use of underground facilities for warfighting, which enhances China's military capacity, the PLA maintains a technologically advanced underground facility (UGF) program. China determined in the 1980s that the UGF program was needed and modernisation effort had a renewed urgency after China observed US and coalition air operations during Operation Desert Storm and in the Balkans in 1999. While the United States has been in continuous conflict, the communist party has been actively studying the tactics of its primary rival. In response, China has been creating underground structures since the 1980s for intercontinental ballistic missiles storage complexes known as the 'Underground Great Wall,' and the threat of military conflict is the reason for increasing capacity. While the storage in Figure 3 is for missile storage, storage of bulk munitions can also be stored using the same system at the national level. China can also use underground storage in the forward storage areas for the PLA.

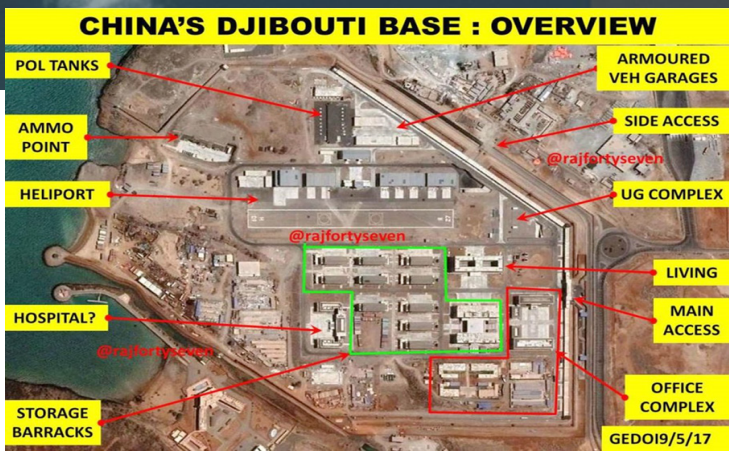
Forward Support Bases/Outposts

China has continued tensions on many fronts, and fiercely protects any land they perceive as their national territory. Contested areas or regions considered autonomous receive a heavy presence from Chinse PLA forces and a buildup of military infrastructure. On land, in occupied Tibet near the province of U-Tsang, the People's Liberation Army has constructed a second underground facility 50 km from the India-China border, and just 60 km from the Indian forward posts. China has been building up this facility, from 2016 for the PLA stationed in the area. China's first underground facility for an ammunition storage facility and the headquarters of the PLA's Tibet Military District has been built up since 2004, as seen in Figure 4. Since, 1998 military units started moving in Lhoka, when the area had received a yearly increase in military infrastructure and accommodated units and headquarters of an artillery brigade. The tension between India-China over the border near Tibet can quickly escalate and China is ready for conflict by moving supplies and equipment. Also, to support these areas, China has an extensive internal road network to get to and from logistical support bases and centers. Along with infrastructure to support the movement, more importantly, they have in place protective measures for munitions to be able to engage and win.

Underground Ammunition Point at Lhoka, China.

On the sea, the defense and even more the expansion of China is just as determined. With infrastructure created from island reefs and a protective Navy near the Parcel/Spratly Islands of the South China Sea. Escalation of tensions can quick-





ly turn into a confrontation at sea. Both the United States and China conduct freedom of movement on international waters near each others' borders, testing the limits of each others' sovereignty. In the South China Sea, China has a vast array of structures ranging from underground ammunition storage areas and administrative buildings to large radar and sensor arrays. On a total of 72 acres of built-up infrastructure on Fiery Cross, Subi, and Mischief Reefs in the Spratlys, and North, Tree, and Triton Islands in the Paracels. Highlighted in yellow in Figure 5 is an example of underground storage for ammunition. These dual-use outposts provide a buffer to China and an added resource to exploit. Increasing capacity on the island reefs offers the PLA stationed there the ability to have a defensive position.

Fiery Cross Reef Infrastructure

In the 'Belt and Road Initiative,' China has made a strong logistical system that it holds as imperative to the future of the Communist Party of China. There is heavy protection in the networks of the BRI. For example, on the Maritime route in Djibouti, China has a base shown in Figure 6. China and Djibouti negotiated a 50-year lease for what is called a logistical support base on 200 acres of land that can hold a brigade-size element. The complex is about a mile from an American base in the same country, where the United States protects its interests. This proximity can easily turn into escalation and Chinas move into the area has been seen as an ever-expanding of China's military might. While China's bases are considered just a logistics base, it has a hardened underground ammunition point with modern automated entry gates, loading/unloading platform, and three main storages with a shelter for motor transport. The protection of both the maritime and road routes is essential to China's military and economic future posture on the global stage.

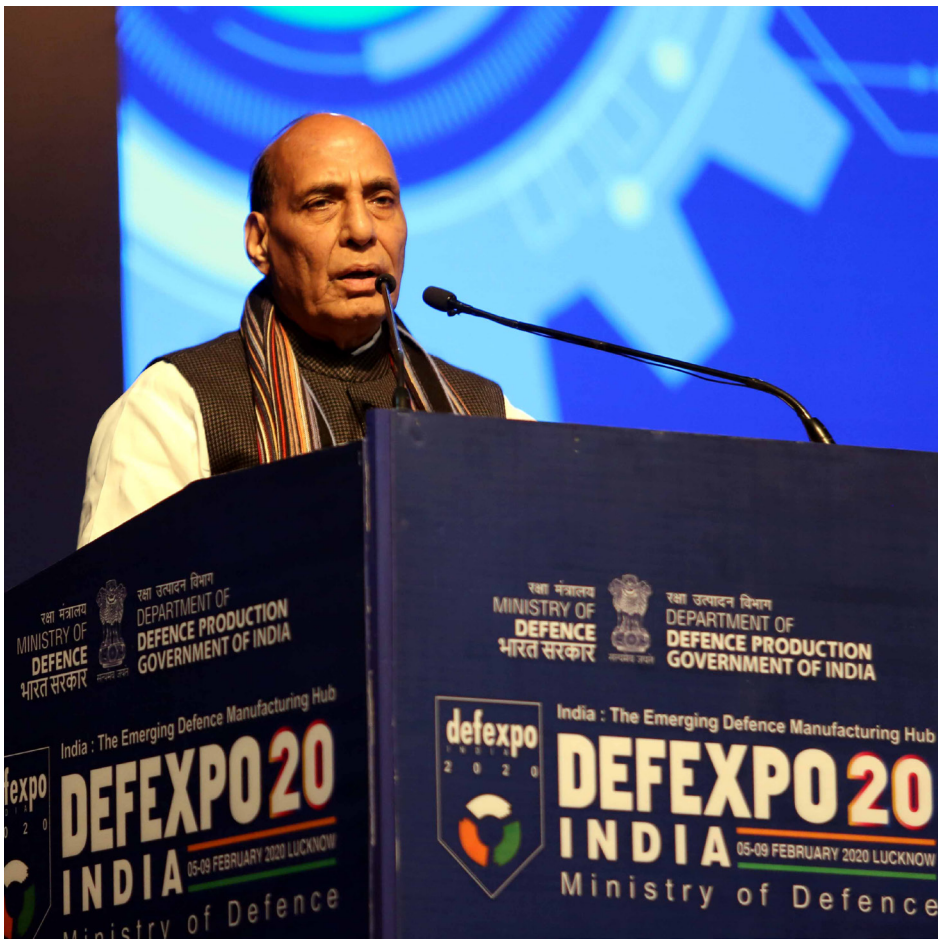
Conclusion

The People's Republic of China has an extensive ammunition supply system and storage capability that flows from production to forward outposts. Using those supply routes will be the same lines of communication when it comes to large-scale combat operations with peer nations. China has put in place a land and sea network that rivals that of the United States. While the United States remains, its economic partner tensions can easily escalate to battles with unfortunate consequences. They can be in the form of sea engagements in the South China Sea or with proxy countries. China has been developing its system and refining how ammunition would flow from each level of storage to the military arm of the Communist Party of China. All the while China has been emphasizing joint logistics and civil-military integration that rivals or even surpasses the United States. Ultimately, ammunition will decide how a war with the first and second economic powers of the world will end up.

(The author is Ammunition Warrant Officer in the US Army, Adjunct Assistant Professor, University of Maryland Global Campus, and Munitions and Explosives Safety Consultant, based in Okinawa, Japan)

Visual impact of DefExpo 2020

Over 200 partnerships involving signing of Memorandum of Understanding (MoUs), Transfer of Technology (ToTs), product launches were concluded on the third day of DefExpo 2020, at a ceremony tilted 'Bandhan', making it the most successful defence business event held in India.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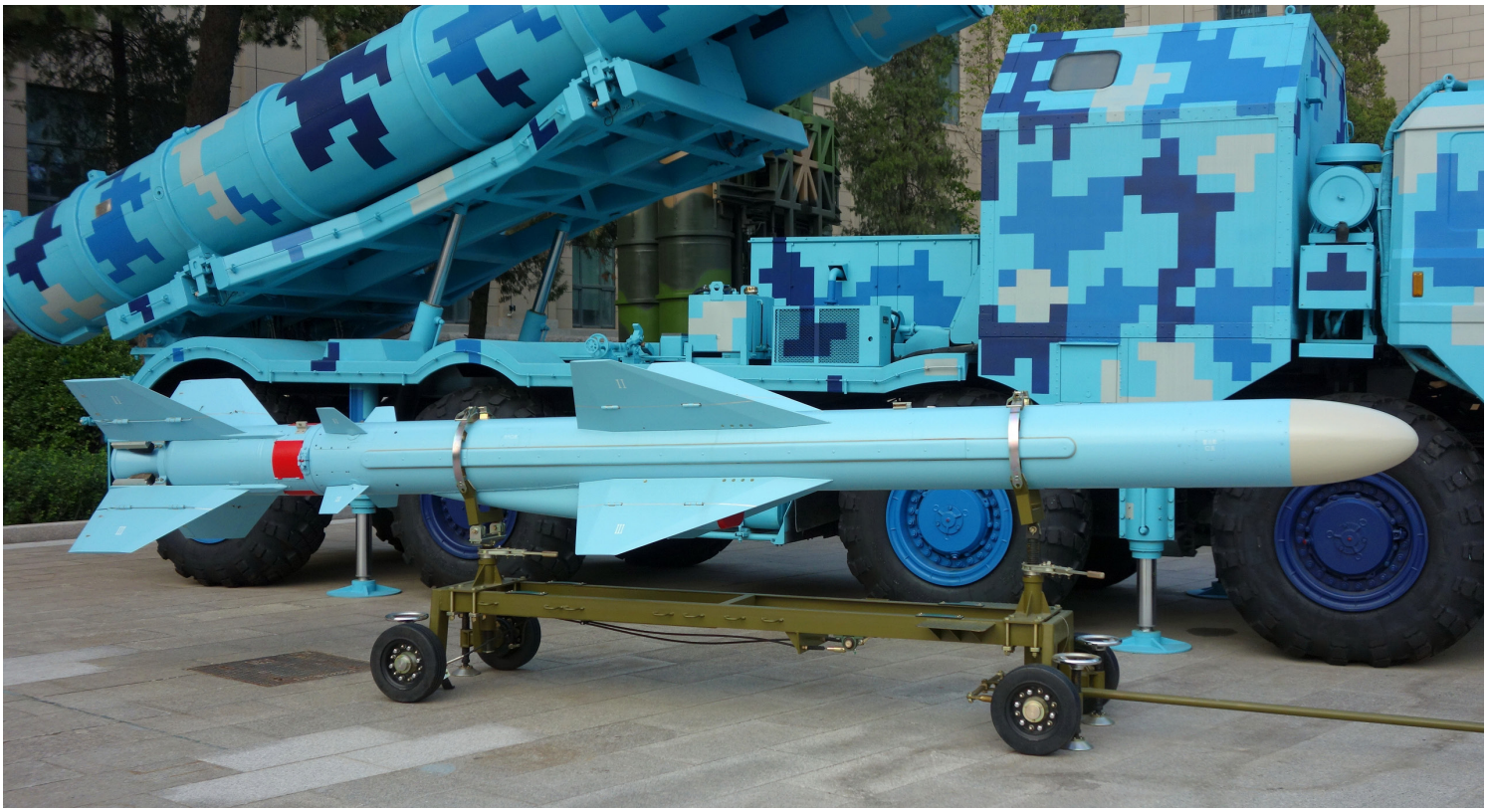
PLA Navy: the world's deadliest sea-denial force



By Atul Kumar

Since mid-2000s, China's great economic transition has been accompanied by its massive military naval expansion. With over 300 warships and a gigantic force of approximately 70 submarines, People's Republic of China's People's Liberation Army - Navy (PLA-Navy) has today emerged as the world's largest maritime force, even bigger than the mighty US Navy. When it comes to naval firepower and strength, PLA-Navy is far more superior than Indian Navy that presently hosts a middling fleet of 130 warships and 17 submarines (15 SSKs, one SSN and one SSBN).

Equipped with a big-league nautical arsenal of latest-class competent surface and undersea combatants involving CV-16 Liaoning and CV-17 Shandong, Type-052D and next-generation Type-055 stealth guided-missile destroyers, Type-054A multi-role frigates, Type-056 corvettes, Yuan-class SSKs, Jin-Class SSBNs and new Shang-class SSNs, China's PLA-Navy has now been actively specialising in highly advanced and ultimate naval weaponry the world has seen since the beginning of this decade.

Under the ingenious supervision of Xi Jinping, massive Research & Development efforts and investment are being flooded into the modernisation of sea denial naval weaponry to offer PLA-Navy an unmatched superiority against the opponents in the region. In this phenomenon, today, Beijing has successfully amassed a modern maritime inventory of guided anti-ship weapons that integrate subsonic and supersonic shipborne as well as land-based truck-launched long-range anti-ship ballistic missiles (ASBM) and anti-ship cruise missiles (AShCM), these impeccable navalised systems are extremely vital for anti-carrier, long-range and accurate naval-strike capabilities of PLA-Navy. Besides this, they are the mainstay of Beijing's Anti Access/Area Denial (A2/AD) strategy playing the primary role to keep the enemy forces at arm's length from China's coastline.

China's Robust Anti-Ship Stocks and 'The Carrier-Killers'

For decades, cruise missiles are the main naval firearms for an anti-ship strike. Primarily, cruise missiles are slower than military fighter jets, some like BrahMos and 3M55 Oniks can travel comparatively fast at constant high supersonic speed and perform tricky airborne manoeuvres to avoid detection, while hypersonic weapons like Russian 3M22 Zircon and Indian BrahMos-II would be unstoppable.

However, China has showcased some very unique strengths in this segment. In a move to shape a genuine anti-ship hegem-

ony, China has already deployed a combined squad of sea denial arms including short-range and medium-range anti-ship cruise missiles (ASCM) and long-range hypersonic anti-carrier anti-ship ballistic missiles (ASBM), across almost all types of these missiles, truck-launched, loaded on strike aircraft or deployed on warships and submarines, these navalised rockets could even make large powerful carriers obsolete near Chinese mainland.

In the 1990s, PLA-Navy was dependent on imported Russian and reverse-engineered Ying Ji-8 (Eagle Strike-8 or YJ-8) short-range subsonic missiles, but at the end of 1990s, PLA-N introduced the YJ-83, a separate, extended-range and improved anti-ship cruise missile. YJ-83 is a subsonic medium-range anti-ship missile developed by China's CASIC, as per western media. An upgraded version of YJ-83 with over 165-190 kg conventional warhead and modern active radar guidance can hit moving sea targets with supersonic pace (only terminal phase) at 150-200 km range effectively. Presently, YJ-83 types are the backbone of PLA-Navy's AshM arsenal.

Since mid-2000s, China's elite missile development institutions have produced several new-generation subsonic and supersonic cruise missiles for PLA-Navy involving medium-range YJ-62 and YJ-12 as well as long-range YJ-100 and YJ-18. YJ-62 and YJ-100 are subsonic weapons, while YJ-12B and YJ-18 (only during terminal phase) can travel at high supersonic speed. YJ-100 (a variant of DH-10) with over 500 miles range is the longest-range ASCM of PLA-N, while Omni-launched YJ-62 ASCM is limited to 400-km. These are the most advanced and lethal ASCM in China's AShM armoury and widely being adopted by PRC's military involving PLA-Navy and PLA-Rocket Force.

Both newly deployed supersonic YJ-12B and 'dual speed' YJ-18 can clock a speed of over 3 Mach, according to Chinese media reports, While YJ-12B is truly supersonic and extremely manoeuvrable, it can take out sea targets at 400-km and attain up to 4 Mach, even faster than Indo-Russian BrahMos. According to Vishnu Som, NDTV Editor, an export variant of YJ-12B, 'CM-302', is being equipped on 'Type-054' frigates being manufactured for Pakistan Navy in a Chinese shipyard, the induction undoubtedly would deliver a much-required impetus to strike capabilities of Pakistan Navy against Indian Navy in the Arabian Sea.

Further, the 'dual-speed' (initial subsonic and terminal high supersonic) YJ-18 ASCM is the central strike weapon being equipped on all major next-generation surface combatants of PLA-Navy. With around 300-kg high explosive warhead and more than 500-km range, approximately double than the US Navy Harpoon AShM, the vertical launched YJ-18 can ex-

tensively damage large-size destroyers and light carriers with high supersonic tempo. Concurrently, in the coming years, these ASCM would significantly increase China's sea denial power in the region.

Further, in a bid to transform its limited-range anti-ship capabilities into robust anti-carrier weapons, Chinese military scientists have successfully developed and tested the world's first long-range anti-ship ballistic weapon based on Dong Feng class, DF-21 and DF-26, strategic weapons. Besides, they are again the first to operationalise these long-range carrier-killers, the fundamental of Beijing's A2/AD strategy.

Currently, China carries land-based high hypersonic, several tons heavy and truck-launched DF-21D and DF-26B anti-ship ballistic missiles specially designed to target moving Carrier battle groups (CBGs) and major military installations from thousands of kilometres away. Backed by spaceborne high-resolution electro-optical and radar sensors, these Chinese ASBMs wield their massive kinetic energy to entirely eliminate a giant carrier with a single conventional warhead impact.

Fitted with advanced guided nose fins, infrared sight and terminal active homing guidance, medium-range DF-21D can be effective close to 1,500 km against surface combatants, while much heavier intermediate-range DF-26B also known as 'Guam Killer' can destroy the US Navy supercarriers from 3,500-4,000 km away.

What's More

Besides, in a move to expand its anti-carrier reach beyond Chinese waters, PLA engineers have also been working on a lighter and long-range air-launched ASBM developing from DF-21D, dubbed as 'CH-AS-X-13', the new weapons with 1,500-2,000-km strike-range would be mounted on China's new H-6N bombers. Besides the US and Japan, this combination would also threaten the Indian Navy surface fleet in the Indo-Pacific. Roland Oliphant at The Telegraph uncovered this new Chinese weapon last year.

Besides, several new anti-ship missiles based on existing in-service weapons have been publicised for export markets such as C-802, CM-402, CM-401, CX-1, and HD-1.

China is also making rapid strides in developing unstoppable hypersonic weapons, a surfeit of new clandestine high-tech weapons has been uncovering during various expos, Chinese national television and military parades.

For instance, a new close-range hypersonic anti-ship ballistic missile, dubbed as CM-401, was displayed by China's CASIC at Zhuhai Airshow in 2018. The missile with the manoeuvrable hypersonic ballistic trajectory can cover a distance of up to 290 km and soon will be available for Chinese forces and its allies.

Moreover, China has also revealed its next-generation unstoppable sea control rockets that would inevitably be the mightiest offshoots of Beijing's strategic deterrence as well as sea control arms. Two new superweapons, during the grand military parade on National Day, DF-17 and DF-100 have been showcased to the world. Any of the world's advanced air defence mechanism would be able to arrest these next-generation Chinese anti-ship rockets as far superior sensors will be needed to sense these threats. The medium-range DF-17 ballistic rocket tailored with WU-14 (now known as DF-ZF) hypersonic glide vehicle (HGV) and around 2000-km range would deliver an exceptionally superior advantage over current DF-21D and DF-26B conventional rockets.

While mysterious DF-100 (Long Sword-100) despite having a Dongfeng designation is a hypersonic cruise missile being developed for China's military including the Navy's anti-ship missile arsenal. As reported by China Times, the DF-100 missile is extensively based on stealth technology and equipped with advanced composite guidance, satellite navigation and a modular conventional warhead that would allow it to destroy targets even aircraft carriers accurately beyond 2000-km without being detected. For India, these indestructible Chinese weapons should be a cause of great concern as they could hit all major Indian military installations in northern as well as the eastern region.

Thus, sith so much of super rockets in its hands, Beijing has already outclassed the rest of the militaries globally, including the US and its allies, in naval strike segment. However, the genuine operational capabilities of PLA-Navy A2/AD weapons against moving targets at sea are still debatable.

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